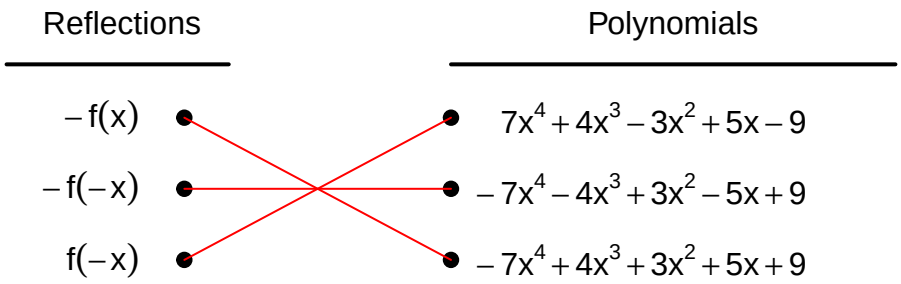
Name: Date:

Exam: Function Reflections (Solution version 624)

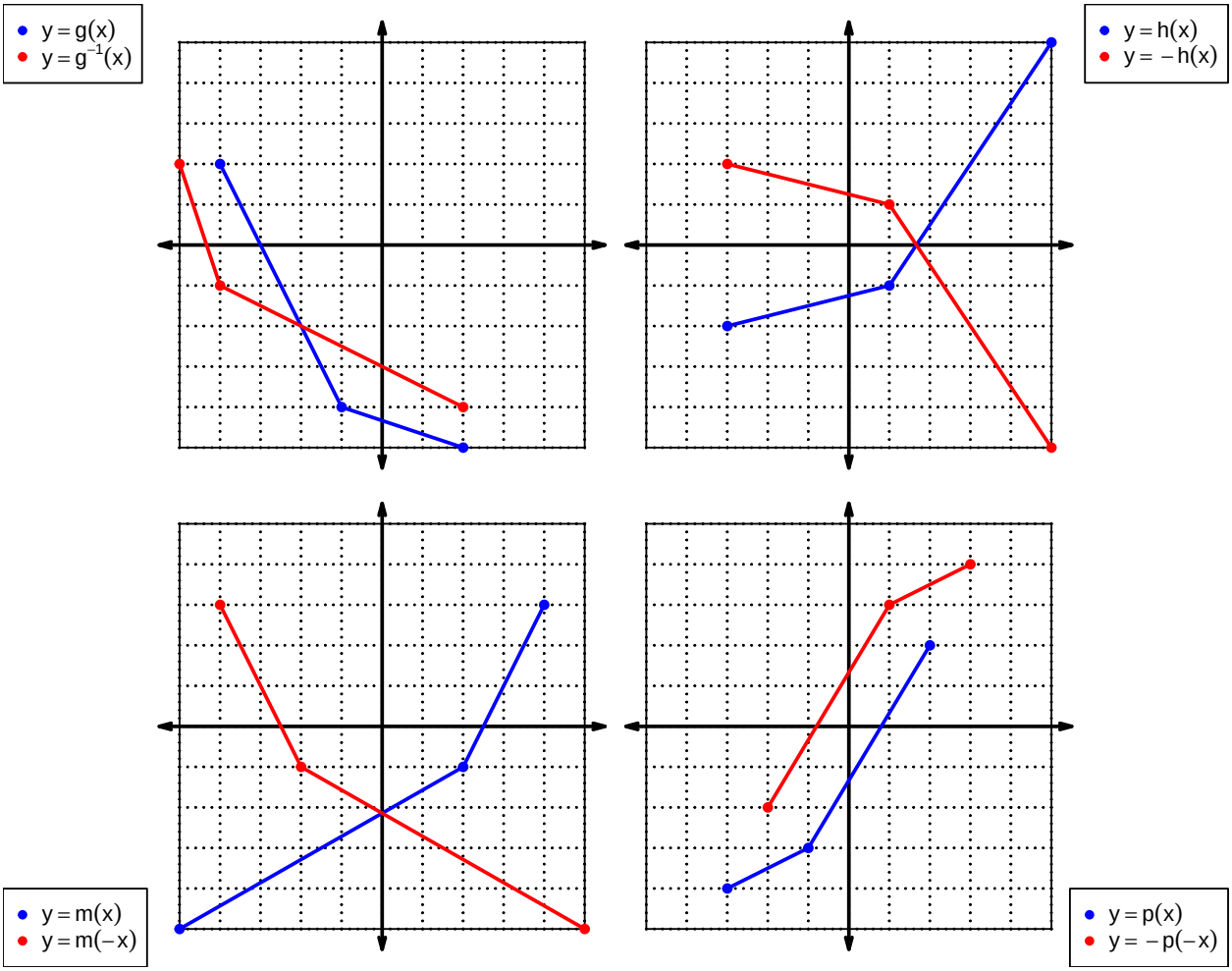
1. (worth 9 points) Let function f be defined by the polynomial below:

$$f(x) = 7x^4 - 4x^3 - 3x^2 - 5x - 9$$

Draw lines that match each function reflection with its polynomial:



2. (worth 20 points) In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	2	1	7
2	5	7	9
3	6	5	1
4	4	3	8
5	8	9	6
6	1	8	2
7	9	6	5
8	7	4	3
9	3	2	4

3. (worth 3 points) Evaluate $f(7)$.

$$f(7) = 9$$

4. (worth 3 points) Evaluate $g^{-1}(4)$.

$$g^{-1}(4) = 8$$

5. (worth 3 points) Assuming f is an **even** function, evaluate $f(-5)$.

If function f is even, then

$$f(-5) = 8$$

6. (worth 3 points) Assuming h is an **odd** function, evaluate $h(-3)$.

If function h is odd, then

$$h(-3) = -1$$

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7. (worth 15 points) A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
Let polynomial p be defined with the following equation:

$$p(x) \;=\; x^3 + x$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) \;=\; (-x)^3 + (-x)$$
$$p(-x) \;=\; -x^3 - x$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) \;=\; -\left(-x^3 - x\right)$$
$$-p(-x) \;=\; x^3 + x$$

c. Is polynomial p even, odd, or neither?

odd

d. Explain how you know the answer to part c.

We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

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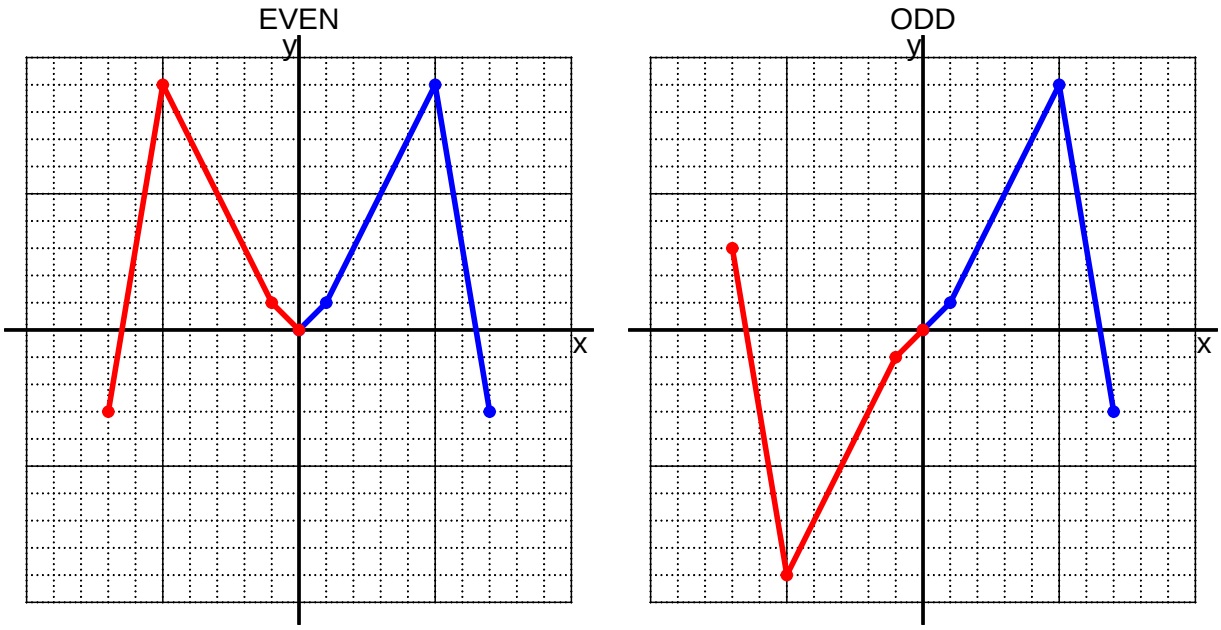
8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.



9. (worth 10 points) Let function f be defined with the equation below.

$$f(x) = 9(x-8)$$

a. Evaluate $f(14)$.

step 1: subtract 8
step 2: multiply by 9

$$f(14) = 9((14)-8)$$
$$f(14) = 54$$

b. Evaluate $f^{-1}(99)$.

step 1: divide by 9
step 2: add 8

$$f^{-1}(x) = \frac{x}{9} + 8$$
$$f^{-1}(99) = \frac{(99)}{9} + 8$$
$$f^{-1}(99) = 19$$

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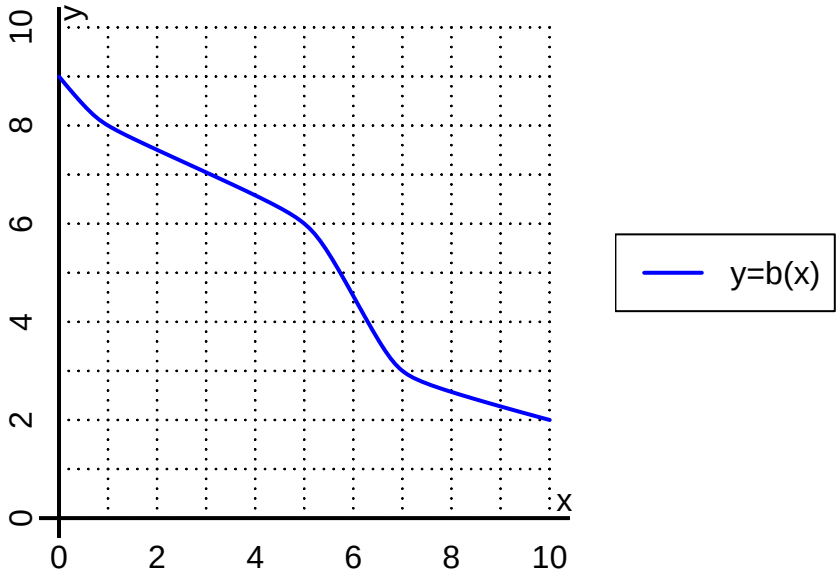
10. (worth 6 points) The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(1)$.

$b(1) = 8$

b. Evaluate $b^{-1}(6)$.

$b^{-1}(6) = 5$

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11. (worth 18 points) Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-6	6	-6	6
-1	-8	8	8	-8
0	0	0	0	0
1	8	-8	-8	8
2	-6	6	-6	6

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.